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Young

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[54] **SENTINEL SYSTEM FOR GREASE EXTRACTING VENTILATORS**

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[63] Continuation of Ser. No. 611,238, Sep. 8, 1975, abandoned.

[51] **Int. Cl.**[2] **G08B 21/00**

[52] **U.S. Cl.** ..... **340/611;** 126/299 D

[58] **Field of Search** ..... 340/240, 241, 229, 239 R; 126/299 A, 299 B, 299 D, 299 F; 98/115 K

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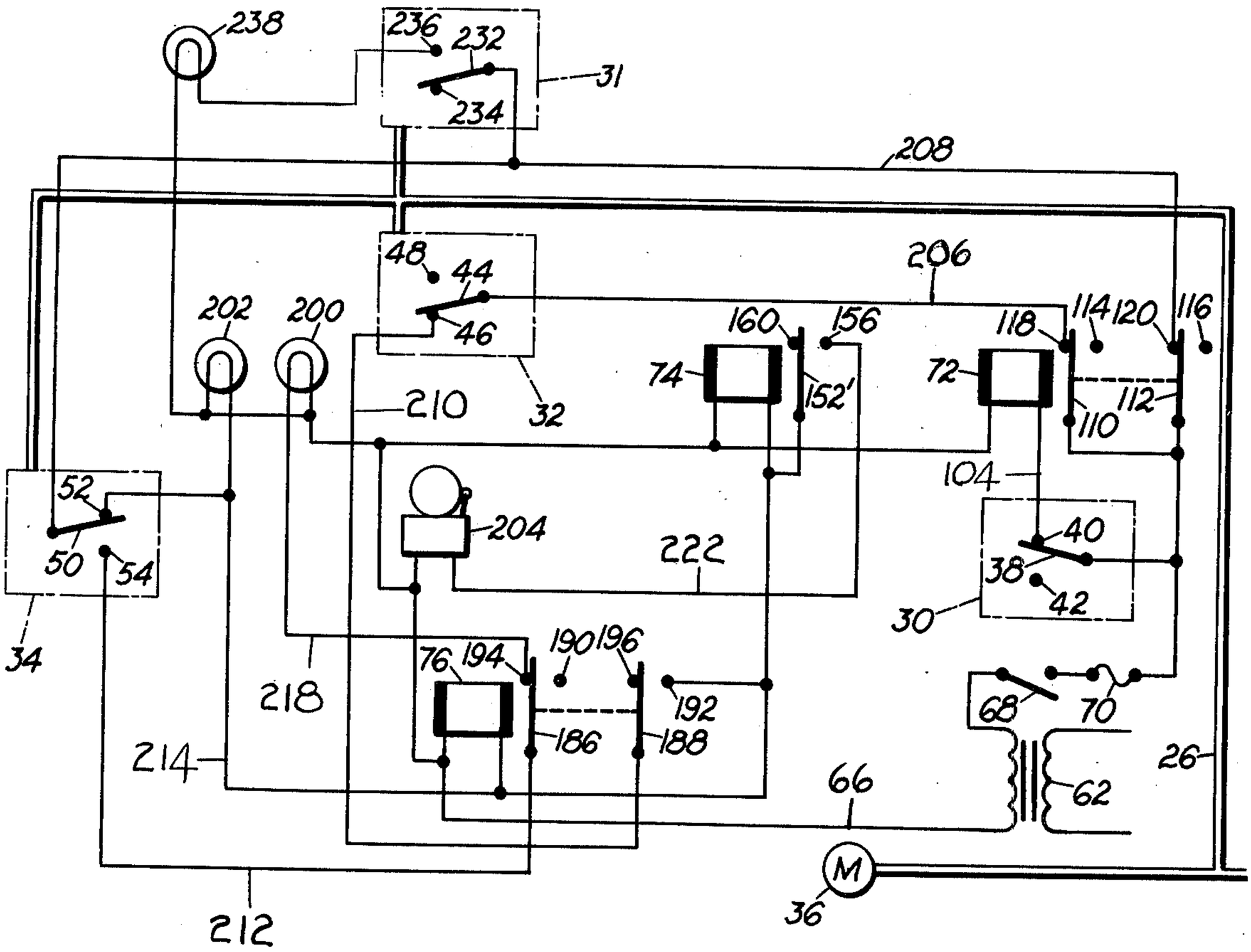
Attorney, Agent, or Firm—Eugene M. Eckelman

[57] **ABSTRACT**

Air switches operated by ventilator pressure are used in combination with an electric circuit to cause an indicating light to be energized as long as a selected volume of air is moving through the ventilator per unit of time. A red light and buzzer are employed to indicate a low pressure, and a meter is also employed for visual inspection of the condition of the system. Time delay relays are employed in the circuit in an arrangement to allow the system to reach operating condition and also to prevent functioning of the indicating means by temporary undesirable pressure conditions in the ventilator. The system also includes indicating means in the area of the fan to allow the workman to determine the condition of the system at the fan.

9 Claims, 5 Drawing Figures



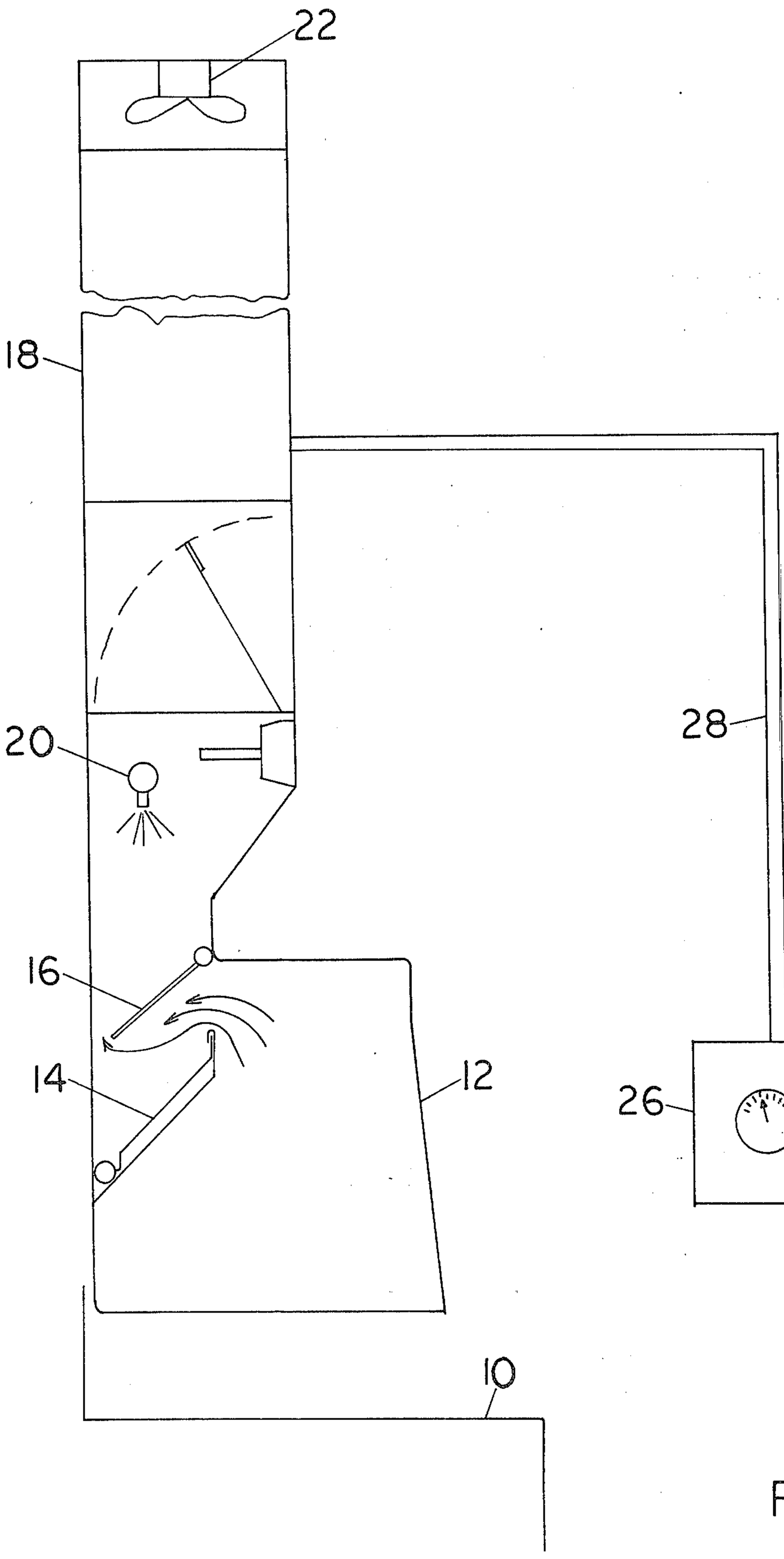
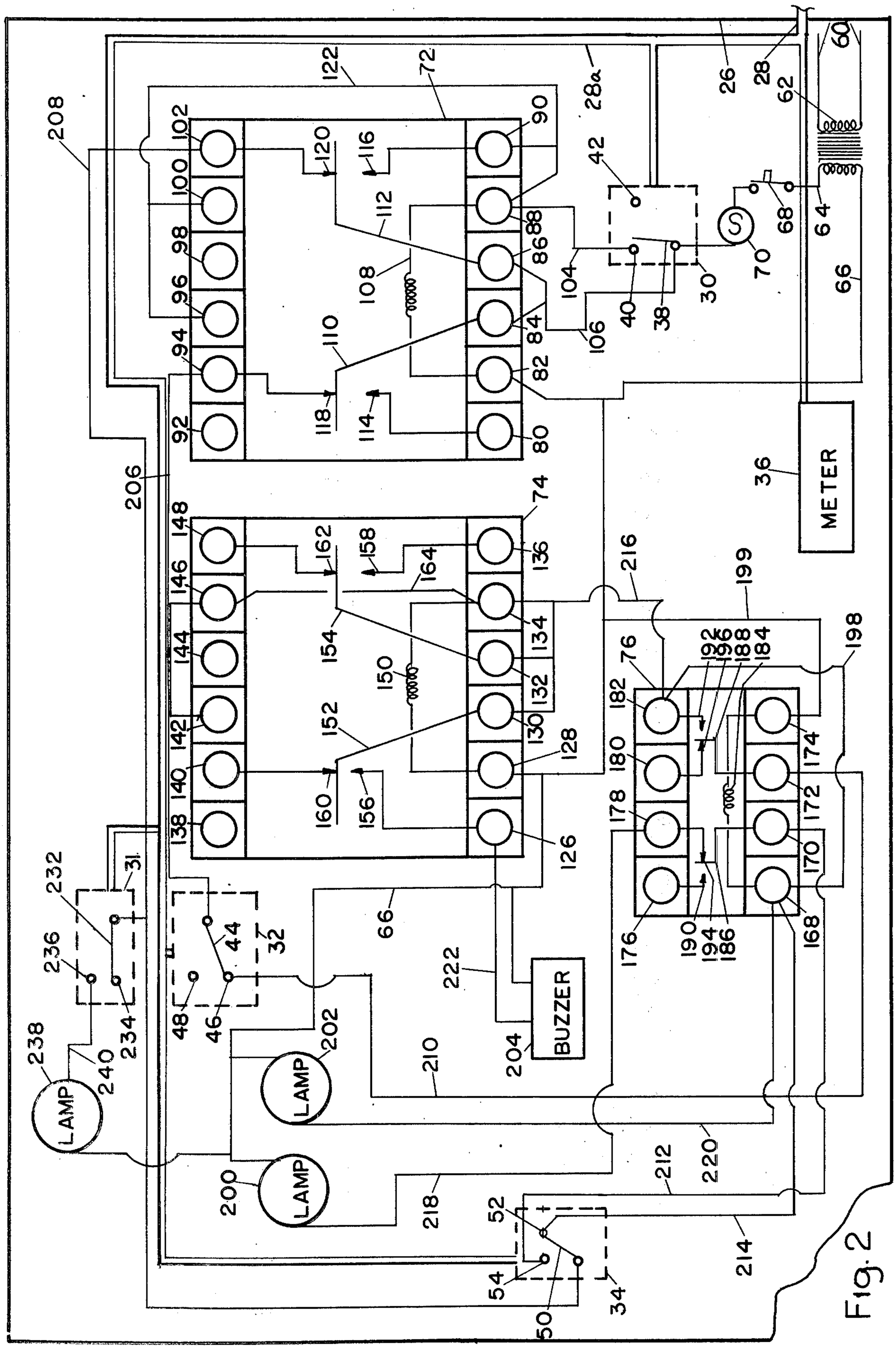


Fig. 1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80
28a
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26
28
62
60
64
68
70
66
104
106
40
38
30
36
METER
74
148
146
144
142
140
138
162
158
164
154
150
152
160
156
136
134
132
130
128
126
206
216
199
198
76
182
180
178
192
196
188
184
174
172
170
168
176
190
194
186
222
BUZZER
210
204
232
31
236
234
238
240
LAMP
48
46
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32
202
200
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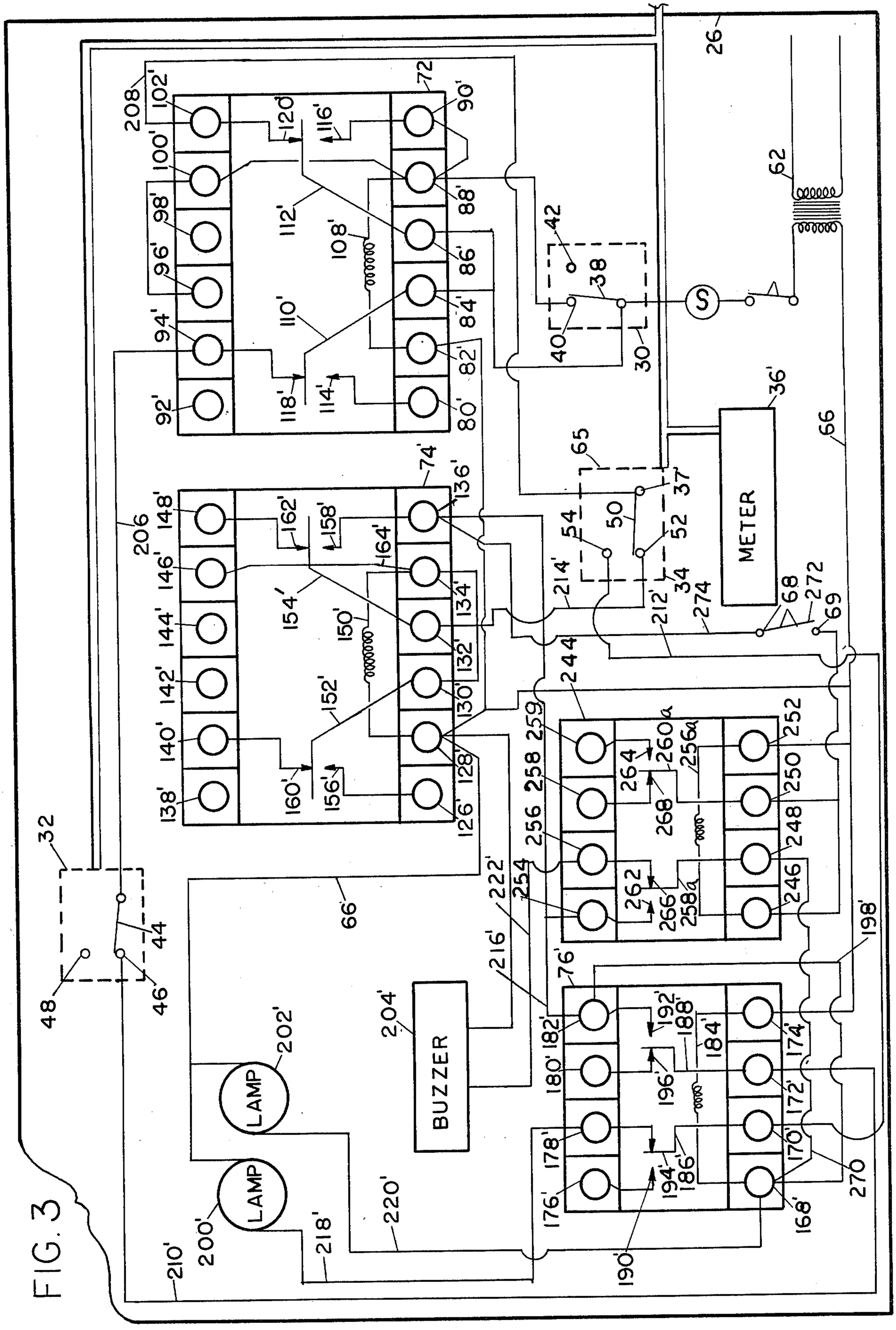
54
50
34

Fig. 2


208
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36'
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37'
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52
34
214'
212'
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68
272
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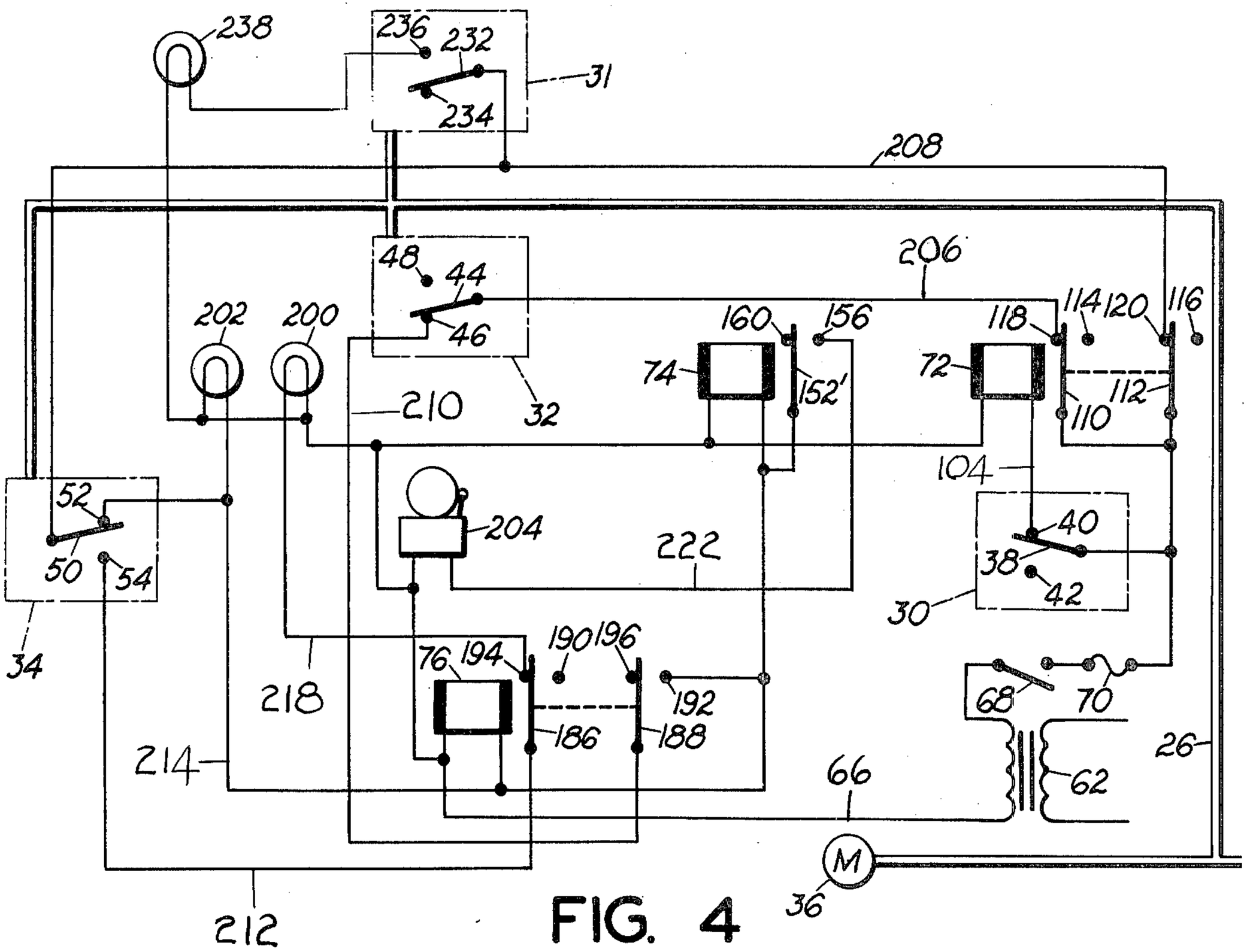
244
259
258
256
254
222'
216'
264
260a
256a
252
250
248
246
268
262
266
258a
76'
182'
180'
178'
176'
192'
188'
184'
196'
194'
186'
174'
172'
170'
168'
190'
270
198'
METER
32
44
48
46
204'
BUZZER
202'
LAMP
200'
LAMP
210'
218'
220'

FIG. 3


238
236
232
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152'
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210
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204
222
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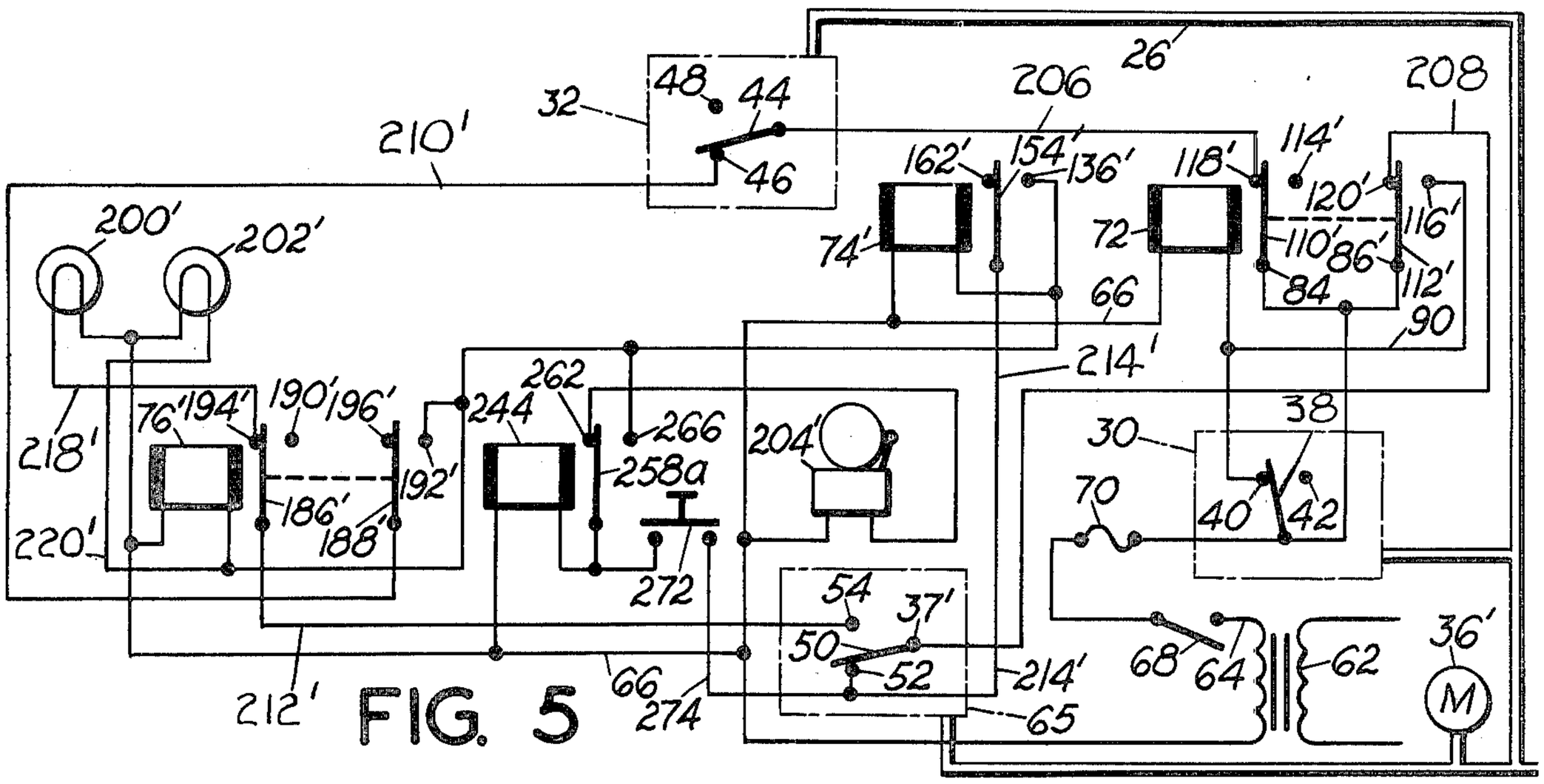
54
30
34
190
196
76
194
218
192
68
70
186
188
214
66
62
26
M
36
212

FIG. 4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214'
218'
76'
194'
190'
196'
244
262
266
204'
38
30
258a
192'
186'
188'
70
40
42
220'
272
54
37'
50
52
68
64
62
36'
M
65
66
274
212'

FIG. 5

SENTINEL SYSTEM FOR GREASE EXTRACTING VENTILATORS

This is a continuation, of application Ser. No. 611,238, filed Sept. 8, 1975, and now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to new and useful improvements in sentinel systems, and particularly pertains to a novel application of such a system in combination with a grease extracting ventilator or like structure.

Grease extracting ventilators utilize forced air fans to remove grease laden air from kitchens or the like and work on the principle of centrifugal force. Their efficiency depends entirely upon the velocity of the air being moved by the fans. At proper velocity, static pressure and cubic feet per minute movement of air, the grease particles are thrown from the air and deposited on the metal of the ventilator and washed away by wash down equipment. When the velocity of air movement drops too low, such as when the fan needs maintenance, the centrifugal force is reduced and the grease is carried up and accumulates on the fan blades, fan housing, and in the duct and usually runs down the outside of the fan housing where it becomes soluble with the roofing. This creates a fire hazard and prevents the owner from getting the desired efficiency.

SUMMARY OF THE INVENTION

According to the present invention and forming a primary objective thereof, a sentinel system is provided that employs means operable by the pressure in the duct of a grease extracting ventilator to indicate the operating condition of the system.

A more particular object is to provide a sentinel system of the type described employing air actuated monitoring means arranged for mounting within the ventilator and capable of operating electrical indicating means showing satisfactory or unsatisfactory operation of the fan system in the ventilator, the sentinel system also employing an air flow meter for visual inspection of the pressure conditions within the ventilator duct collar.

Another object is to provide a sentinel system as described which also includes electrical controls arranged to prevent operation of the indicating means during temporary air pressure fluctuations. Still another object is to provide a sentinel system as described employing indicating means in the area of the fan to allow the workman to determine the condition of the system without making repeated trips from the fan to the main panel of indicating means.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagrammatic view of a grease extracting ventilator of a type in common use and showing the present sentinel system in association therewith;

FIG. **2** is a diagrammatic view and wiring layout of a sentinel system embodying a first form of the invention;

FIG. **3** is a view similar to FIG. **2** but showing a modification of the invention; and

FIGS. **4** and **5** are simplified schematic views of the embodiments of FIGS. **2** and **3**, respectively.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The present invention is associated with grease extracting ventilators or the like wherein efficiency of the system depends upon the existence of a selected velocity of air movement, for example, a selected cubic feet per minute air flow. A grease extracting ventilator in common use is shown in FIG. **1** and comprises a grill portion **10** and hood **12**. The hood **12** has baffles **14** and **16** and an upwardly extending stack **18**. The stack includes wash down nozzles **20** and further includes a suction fan **22** at an upper portion thereof. As stated above, as long as the velocity of the air moving through the stack is proper by efficient operation of the fan, grease particles are deposited on the metal of the ventilator and washed away during the wash cycle. However, if the velocity of the air reduces below a certain force, as by improper operation of the fan **22**, the grease is not properly deposited on the ventilator but is carried away such as up to the roof.

Applicant's sentinel system includes a panel box **26** which houses a principal portion of the operating means and circuitry to be described, including a plurality of air switches, to be described, operated by the static pressure in the stack **18**. Communication between the stack and the panel box **26** to the air switches is through a suitable conduit **28** in communication at one end with the interior of the stack and leading to the box **26** for connection to the air switches. Panel box **26** is preferably located in the cooking area or other area which makes it readily visible to kitchen personnel or maintenance persons.

With particular reference to FIGS. **2** and **4**, the conduit **28** from the stack leads into panel box **26** and has an extension **28***a* in such box leading to four vacuum operated switches **30**, **31**, **32**, and **34** and to an air flow meter **36**, the meter **36**, being mounted on the front of panel box **26**, FIG. **1**, for viewing. For a reason to be more apparent hereinafter, switches **30**, **31**, **32**, and **34** are set to operate at different negative pressures, with the switch **30** operating at a lower negative pressure than both of switches **32** and **34** and the switch **34** operating at a lower negative pressure than switch **32**. For example, the operating pressures of switches **30**, **32** and **34** respectively may be ½ inch, 1 inch, and 4/5 inch. The setting of switch **31** will be detailed hereinafter. It is apparent that as the negative pressure in the stack builds up from zero, the switch **30** operates first, the switch **34** next and the switch **32** last, and conversely as the said pressure reduces from a proper operating condition, the switch **32** will drop out first, the switch **34** will drop out second, and the switch **30** will drop out last.

Switch **30** has a switch arm **38** normally engaging a contact **40** therein or in other words engaging such contact when the negative pressure in the stack is below the set valve of the switch, or too when the system is off. In the operative condition of the system arm **40** is moved away from contact **40** and engages a stop **42**.

Switch **32** has a switch arm **44** normally engaging a contact **46** or in other words engaging such contact when the negative pressure in the stack is below the set valve of the switch or when the system is off. In the pressured operation of the switch **32**, arm **44** is moved away from contact **46** and engages a stop **48**.

Switch **34** has a switch arm **50** normally engaging a contact **52**, or in other words engaging such contact when the negative pressure in the stack is below the set value of the switch or when the system is off. In the pressured operation of switch **34**, arm **50** is moved away from contact **52** and engages a contact **54**.

The electrical circuitry for the present system includes infeed lines **60** to a transformer **62** the secondary of which has feed lines **64** and **66**, respectively, compris-

ing a low source of voltage such as 24 volts for the system. Wire **64** leads to the base of contact arm **38** of switch **30** and has an on-off switch **68** and a fuse assembly **70** therein.

The system incorporates three relays **72, 74** and **76**, the relays **72** and **74** being time delay relays. Relay **72** has a first set of terminals **80, 82, 84, 86, 88** and **90** and a second set of opposite terminals **92, 94, 96, 98, 100** and **102**. A wire **104** extends from contact **40** of switch **30** to terminal **88** and a wire **106** extends from switch arm **38** to both terminals **84** and **86**. Feed line **66** from transformer **62** leads to terminal **82**, and the coil **108** of relay **72** is connected to this terminal **82** and to terminal **88**. A pair of armature arms **110** and **112** in relay **72** have engagement with contacts **114** and **116**, respectively, in the energized condition of the relay and have engagement with contacts **118** and **120**, respectively, in the deenergized condition of the relay. Contacts **114** and **116** are connected electrically to terminals **80** and **90**, respectively, and contacts **118** and **120** are connected electrically to terminals **94** and **102**, respectively. A seal-in circuit **122** for relay **72** extends between terminals **88, 90, 96** and **100**, and such circuit when once activated will hold the relay **72** in energized condition until it times out, for example, 1½ minutes or for an appropriate time which as will be seen hereinafter is sufficient to allow the stack pressure to develop from start to the desired level. The seal-in circuit and other relay parts are not detailed in view of their conventional structure.

Relay **74** has a first set of terminals **126, 128, 130, 134** and **136** and a second set of opposite terminals **138, 140, 142, 144, 146** and **148**. The coil **150** of this relay is connected to terminals **128** and **134**, and armature arms **152** and **154** have engagement with contacts **156**, and **158**, respectively, in the energized condition of the relay and have engagement with contacts **160** and **162**, respectively, in the deenergized condition of the relay. Contacts **156** and **158** are electrically connected to terminals **126** and **136**, respectively, and contacts **160** and **162** are electrically connected to terminals **140** and **148**, respectively. A seal-in circuit **164** extends between terminals **134, 142** and **146** and such circuit when once activated will hold the relay **74** in energized condition until it times out, for a purpose to be explained hereinafter. Terminal **128** is connected to feed line **66**.

Relay **76** has a first set of terminals **168, 170, 172** and **174** and a second set of opposite terminals **176, 178, 180** and **182**. The coil **184** of this relay is connected to terminals **168** and **174** and armature arms **186** and **188** have engagement with contacts **190** and **192**, respectively, in the energized condition of this relay and have engagement with contacts **194** and **196**, respectively, in the deenergized condition of the relay. Contacts **190** and **192** are connected to terminals **176** and **182**, respectively, and contacts **194** and **196** are connected to terminals **178** and **180**, respectively. Terminals **168** and **182** are connected electrically by a by-pass wire **198** and terminal **174** is connected to feed line **66**.

Incorporated in the system is a light **200** comprising an efficiency light that designates, when lighted, a proper operating condition of the system. Also incorporated in the system is a light **202** comprising a trouble light that is lighted when the static pressure in the stack is below its operating level. Furthermore, an audible signal such as a buzzer **204** is employed in the system to also designate trouble.

Electric circuitry for the components described comprises a wire **206** extending from terminal **94** of relay **72** to the base of switch arm **44** of pressure switch **32** and a wire **208** extending from terminal **102** of relay **72** to the base of arm **50** of pressure switch **34**. A wire **210** extends from contact **46** of pressure switch **32** to terminal **172** of relay **76**.

A wire **212** extends from contact **54** of pressure switch **34** to terminal **170** of relay **76**, and a wire **214** extends from contact **52** of this same switch to terminal **168**. A wire **216** extends from terminal **182** of relay **76** to terminals **130, 132** and **134** of relay **74**. Efficiency light **200** is electrically connected to feed line **66** and to terminal **178** of relay **76** by wire **218** and trouble light **202** is electrically connected to feed line **66** and to terminal **168** of this same relay by a wire **220**. Buzzer **204** is electrically connected to feed line **66** and to terminal **126** by a wire **222**. Switch **31** has a switch arm **232** normally engaging a stop **234** or in other words normally engaging such stop when the negative pressure in the stack is below the set value of the switch or when the system is off. In the pressured condition of the switch **31**, arm **232** is moved away from stop **234** and engages a contact **236**. Arm **232** is connected to wire **208**. Switch **31**, like the other pressure sensitive switches in the system, has a selected operating pressure and for a reason to be more apparent hereinafter it is set to operate at a greater negative pressure than the other switches, for example, 1¼ inches.

An indicating light **238** mounted in the area of the fan is electrically connected to feed line **66** and to contact **236** of switch **31** by a wire **240** and is provided for the purpose of allowing the workman to readily adjust the fan to its proper working condition while staying at the fan, as will be more apparent hereinafter.

With regard to the operation of the present system, switch **68** is normally closed and the system is activated by switch means, not shown, that admits power to transformer **62** and to the fan **24** as well. Switch **68** is utilized generally only when it is desired to deactivate the sentinel and keep the fan in operation. At the moment the system is turned on and for a short while thereafter, namely, until such time that the static pressure operates switch **30**, it is apparent that arm **38** of switch **30** will be in engagement with contact **40**. The coil **108** of relay **72** will be immediately energized by the circuit through arm **38**, contact **40**, wire **104**, and terminals **88** and **82** to feed line **66**. This will cause engagement of armature arms **110** and **112** with their respective contacts **114** and **116** and no current exists beyond relay **72**. Seal-in circuit **122** will also be energized at the beginning of operation and the relay will begin its timing cycle. Arm **38** of switch **30** will move over to stop **42** as soon as the negative pressure develops in the stack equal to the setting of such switch but since the relay is sealed in by its seal-in circuit, it will operate through its time cycle in energized condition.

When the relay **72** deenergizes, circuits are then established to both switches **32** and **34**, as well as to switch **31**. Such circuits extend through wire **106** from switch **30**, terminal **84**, armature arm **110**, contact **118**, terminal **94**, and wire **206** to switch **32**, and through wire **106**, terminal **86**, armature arm **112**, contact **120**, terminal **102**, and wire **208** to switches **31** and **34**. For the present, it will be assumed that the stack pressure is satisfactory, whereby arm **44** of switch **32** will have moved into engagement with stop **48** and arm **50** of switch **34** will have moved into engagement with contact **54**. The

circuit in wire **206** dead-ends at arm **44**. A circuit is established in wire **208**, contact arm **50** of switch **34**, contact **54**, wire **212**, terminal **170** of relay **76**, contact arm **186**, contact **194** and terminal **178** of this same relay, wire **218**, efficiently light **200** and lead wire **66**. Thus, with the system in proper operation, efficiency light **200** will be lighted to show such proper operation. Of course, the static pressure can be determined by viewing the meter **36** but light **200** gives visual indication of proper operating condition from a distance.

In the event that the fan malfunctions or the static pressure in the stack otherwise changes so as not to be at its desired operating level, arm **44** of switch **32** moves into engagement with contact **46**. At this position of the switch **32**, the status of relay **76** does not change since the circuit from such switch exists only in wire **210** and said circuit dead-ends at terminal **180** thereof. However, as the static pressure reduces further, arm **50** of switch **34** moves over onto contact **52**. This interrupts the circuit to wire **212** and the efficiency light **200** turns off. At the same time a circuit is established in wire **214**, and the relay **76** is energized by the circuit through wire **214**, terminal **168**, coil **184**, terminal **174** and feed line **66**. This condition of relay **76** turns on the trouble light by the circuit established through wire **214**, terminal **168** of relay **76**, wire **220**, light **202**, and feed line **66**.

Furthermore, by the energization of relay **76**, time delay relay **74** will also be energized by the circuit through wire **214**, terminal **168**, by-pass wire **198**, terminal **182**, wire **216**, terminal **134** of relay **74**, coil **150**, terminal **128**, and feed line **66**. The buzzer **204** is activated when the relay **74** is energized by a circuit through wire **216**, terminal **130** of relay **74**, armature arm **152**, contact **156**, terminal **126**, wire **222**, buzzer **204**, and feed line **66**. Relay **74** will remain energized by its seal-in circuit **164** until it times out and thus the buzzer will sound continuously until the end of the timed cycle. When the relay **74** deenergizes, the buzzer will stop. The relay **76**, however, will remain energized since a circuit is established to said coil through switch **32**, wire **210**, terminal **172**, armature arm **188**, contact **192**, terminal **182**, wire **198**, terminal **168**, terminal **174**, and line **199** to feed line **66**. The trouble light **202** will thus remain lighted until the system is shut off or until the fan is speeded up to the point where wires **210** and **214** are cut off from the source through relay **72**. Thus, if the system does not correct itself, a constant warning is maintained by the light **202** that trouble exists.

Once the relay **76** is energized, it will have a seal-in circuit as just described through switch **32** and thus there will be no rocking on and off of the light **202** and buzzer **204** if the static pressure varies close above and below the setting of switch **34** and the latter is repeatedly opening and closing. Thus, once the switch **34** causes the efficiency light **200** to turn off and the trouble light **202** and buzzer **204** to turn on, the light **202** will stay on until the system is shut off or the pressure in the stack is corrected.

Air switch **31** is utilized for the convenience of the workman to allow him to readily adjust the fan without traveling up and down between the fan **24** and the panel box **26**. That is, the light **238** is mounted in the area of the fan **24**, and being in the circuit with efficiency light **200** it will be lighted when the conditions are proper. The workman in making the adjustment accomplishes such adjustment of whatever is faulty to cause the switch **232** to move into engagement with contact **236**, thus completing the circuit to light **238**, namely, from wire **208** through arm **232**, contact **236**, wire **240** and through said light to feed line **66**. As stated hereinbefore, the pressure setting of switch **31** is greater than the other switches. Preferably such setting is at the top of the pressure range so that when adjustment is made while at the fan to the extent that the light **238** is lighted, the workman is sure that the system is operating satisfactorily. He does not thus have to go up and down between the fan and the panel box during the adjusting process and much time is saved.

Referring to FIGS. **3** and **4**, a second embodiment of the invention is provided and employs a circuit somewhat similar to that shown in FIG. **2** except means are provided for shutting off the buzzer **204** prior to the time that its relay **74** times out. That is, it may be desired that the buzzer not ring for a minute and a half or whatever the timed sequence of relay **74** is. Rather than merely providing an on/off switch to the buzzer which would have the disadvantage that such switch may not get turned on again after the system had been rendered operative, the buzzer is incorporated in a modified circuit that provides a turnoff therefor but at the same time it is maintained in the circuit for automatic reincorporation in the circuit.

The embodiment of FIG. **3** utilizes the three air switches **30**, **32** and **34** in the same manner as in the FIG. **1** embodiment and the circuit from transformer **62** up through the relay **72** and to the air switches **32** and **34** is identical. The system also employs an air flow meter **36'**, an efficiency light **200'**, a trouble light **202'** and a buzzer **204'**. The air switch **31** and its indicating light **238** of FIG. **1** are not illustrated in FIG. **3**, but such components could as well be used with this embodiment.

Relay **74'** has a first set of terminals **126'**, **128'**, **130'**, **134'** and **136'** and a second set of opposite terminals **138'**, **140'**, **142'**, **144'**, **146'** and **148'**. The coil **150'** of this relay is connected to terminals **128'** and **134'**, and armatures arms **152'** and **154'** have engagement with contacts **156'** and **158'**, respectively, in the energized condition of the relay and have engagement with contacts **160'** and **162'** respectively in the deenergized condition of the relay. Contacts **156'** and **158'** are connected to terminals **126'** and **136'** respectively and contacts **160'** and **162'** are connected to terminals **140'** and **148'** respectively. The numeral **164'** designates the seal in circuit and once energized, the relay **74'** will remain in such condition until it times out and the buzzer will ring during the time. Terminal **128'** is connected to feed line **66**.

Relay **76'** has a first set of terminals **168'**, **170'**, **172'** and **174'** and a second set of opposite terminals **176'**, **178'**, **180'** and **182'**. The coil **184'** of this relay is connected to terminals **168'** and **174'** and armature arms **186'** and **188'** are in engagement with contacts **190'** and **192'** respectively in the energized condition of this relay and have engagement with contacts **194'** and **196'** respectively in the deenergized condition of the relay. Contacts **190'** and **192'** are connected to terminals **176'** and **182'** respectively and contacts **194'** and **196'** are connected to terminals **178'** and **180'** respectively. Terminals **168'** and **182'** are connected electrically by a by-pass wire **198'** and terminal **174'** is connected to feed line **66**.

Also incorporated in the FIG. **3** embodiment is a relay **244** having a first set of terminals **246**, **248**, **250**, **252** and a set of opposite terminals **254**, **256**, **258** and **259**. The coil **256***a* of this relay is connected to terminals **246** and **252** and armature arms **258***a* and **260***a* are in engage-

ment with contacts **262** and **264** respectively in the energized condition of the relay and have engagement with contacts **266** and **268** respectively in the deenergized condition of the relay. Contact **252** is connected to feed line **66**.

Electric circuitry for the components described comprises a wire **210'** extending from arm **44** with pressure switch **32** to terminal **172'** of relay **76'**. A wire **212'** extends from contact **54** of pressure switch **34** to terminal **170'** of relay **76'** and a wire **214'** extends from contact **52** to terminals **130' 132'** and **134'** of relay **74'**. A wire **216'** extends to terminal **136'** of relay **74'** and also to terminals **254** and **260** of relay **244**.

Efficiency light **200'** is electrically connected to feed line **66** and to terminal **178'** of relay **76'** by wire **218'** and trouble light **202'** is electrically connected to feed line **66** and to terminal **168'** of this same relay by a wire **220'**. Buzzer **204'** is electrically connected to one side to feed line **66** and on the other side to terminal **256** of relay **244** by means of a wire **222'**. A wire **270** is connected between terminal **168'** of relay **76'** and terminal **248** of relay **244**.

A normally open push button switch **272** is incorporated in a wire **274** connected at one end to terminal **136'** of relay **74'** and at its other end to terminals **246** and **250** of relay **244**.

In the operation of the FIG. **3** embodiment, relay **72** operates the same as in FIG. **1** wherein when it times out current is supplied to wires **206** and **208** leading respectively to air switches **32** and **34**. If the stack pressure is satisfactory, switch arm **44** of switch **32** engages stop **48** and no current passes through the switch and arm **50** of switch **34** engages contact **54** and the efficiency light **200'** is turned on by the circuit from wire **208**, through the switch **34**, wire **212'**, terminal **170'** of relay **76'**, armature arm **186'**, contact **194'**, terminal **178'**, wire **218'**, the light **200'** and feed line **66**.

When the static pressure in the stack reduces below a desired operating level, arm **44** of switch **32** moves into engagement with the contact **46**. Although current is admitted to wire **210'**, this circuit is still dead ended in terminal **180'** and relay number **3** is not energized. However, as the static pressure in the stack further reduces, the arm **50** of switch **34** moves onto contact **52** and the circuit to light **200'** is broken. Time delay relay **74'** and relay **76'** are both energized at this time. Relay **74'** is energized by a circuit from contact **52** of switch **34** through wire **214'**, terminal **134'**, coil **150'**, terminal **128'**, and to feed line **66**. With the energization of relay **74'** a circuit is also established in contact **52** of switch **34** through wire **214'**, terminal **132'**, armature arm **154'**, contact **158'**, terminal **136'**, wire **216'**, terminal **182'** of relay **76'**, wire **198'**, terminal **168'**, coil **184'**, terminal **174'**, and feed line **66**. The buzzer **204** is simultaneously turned on by a circuit through contact **52** of switch **34**, wire **214'**, terminal **132'**, armature arm **154'**, contact **158'**, terminal **136'**, wire **216'**, terminal **182'**, wire **198'**, terminal **168'**, wire **270**, terminal **248** through to terminal **256**, wire **222'**, buzzer **204'**, and to feed line **66**. The buzzer will stay on until the relay **74'** deenergizes whereby its circuit through the arm **154'** of this relay will be broken.

Light **202'** will also light when trouble occurs, and the circuit to the light is through contact **46**, wire **210'**, terminal **172'**, through to terminal **182'**, wire **198'**, terminal **168'**, wire **220'**, light **202'**, and feed lines **66**.

Light **202'** stays lighted as long as relay **76'** is energized, and this latter relay once energized will remain in that condition until switch arm **44** is moved to contact **48** or until the system is shut off, and such seal-in circuit exists through contact **46** of switch **32**, wire **210'**, terminal **172'** through to terminal **182'**, wire **198'**, terminal **168'**, through the coil **184'**, and to the lead line **66**. The light **202'** will remain lighted as long as the relay **76'** is energized.

The primary function, as described above, of the FIG. **3** embodiment is to shut off the buzzer **204'** before the relay **74'** times out. Shutting off the buzzer **204'** is accomplished by closing switch **272**. It is apparent from the diagram that the wire **274** in which the switch **272** is incorporated is in circuit with the coil **256***a* of relay **244**, and upon closing of the switch, a circuit to the coil **256** is established. Energizing relay **244** breaks contact **266** from arm **258** shutting off the buzzer. This in turn makes the circuit between terminal **250**, arm **260** and terminal **246** which seals in the coil of relay **244**. Thus, when the operator is alerted to the fact that the stack pressure is not proper, by a ringing of the buzzer, he can turn the buzzer off in the event that such is desired.

It is to be understood that the form of my invention herein shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A sentinel system for sensing fluid pressure in a stack of the type having a fan developing static pressure, said system comprising,

(a) first and second pressure operated switches,

(b) means arranged to connect said switches in communication with the interior of said stack,

(c) said two switches having different static operating pressures with said second switch being set to operate at a lower static pressure than said first switch,

(d) an electric circuit,

(e) an electrically operated warning indicating means in said circuit having on and off conditions,

(f) said indicating means being controlled in its operation by said second switch and indicating undesirable static pressure in the stack,

(g) and holding means in said circuit controlled in its operation by said first switch for holding said warning indicating means in on position even though the static pressure varies above and below the setting of said second switch.

2. The sentinel system of claim **1** including an audible signal in said circuit controlled in its operation by said second switch to designate undesirable static pressure in the stack.

3. The sentinel system of claim **1** including an efficiency light in said circuit operated by said second switch to show a satisfactory static pressure in the stack.

4. The sentinel system of claim **1** including a trouble light in said circuit operated by said second switch to show an unsatisfactory static pressure in the stack.

5. The sentinel system of claim **1** including an efficiency light in said circuit operated by said second switch to show a satisfactory static pressure in the stack, and a trouble light in said circuit also operated by said second switch to show an unsatisfactory static pressure in the stack.

6. The sentinel system of claim **1** wherein said holding means is structurally arranged to maintain said warning indicating means in on condition until the static pressure is raised to the setting of said first switch.

7. The sentinel system of claim 1 including a third pressure operated switch arranged to be connected with the interior of the stack, said switch having a higher static operating pressure than said first switch, and indicating means in said circuit controlled in its operation by said third switch, said indicating means being arranged to be mounted adjacent to the stack at the fan.

8. The sentinel system of claim 1 including an audible signal in said circuit controlled in its operation by said second switch, and relay means maintaining said audible signal in a timed on condition even though the static pressure has been corrected.

9. The sentinel system of claim 8 including a manual switch in the circuit to said audible signal for turning it off prior to the completion of the timed on condition thereof by said relay means.

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